

REMARKS

Claims 9-13, 20, 30, 32 and 34-39 are currently pending in this application. Claims 1-8, 14-19, 21-29, 31 and 33 have been canceled. Claims 10 and 11 have been amended for clarity. No new matter has been added by way of the above-amendment.

Applicants note with appreciation that the Examiner has indicated that claims 35-39 have been allowed.

I. Issues under 35 U.S.C. § 112

Claims 9-13 are rejected as being indefinite under 35 U.S.C. § 112, second paragraph. Applicants respectfully traverse the rejection.

It appears that there remains confusion about the particle sizes of the respective particles in claims 9 and 10. As is recited in claim 9, the method requires:

- 1) A first step of obtaining a soft agglomerate of cuprous oxide ultrafine particles having an average secondary particle diameter of not less than 0.2 μm ;
- 2) A second step of separating the soft agglomerate from the first solvent; and
- 3) A third step of redispersing the separated soft agglomerate in a second solvent, thereby obtaining a dispersion of cuprous oxide ultrafine particles.

In short, the phrase "a secondary particle diameter of not less than 0.2 μm " recited in claim 9 indicates a secondary particle diameter of the soft agglomerate of cuprous oxide ultrafine particles obtained *in the first step*.

On the contrary, the phrase "an average secondary particle diameter of less than 200 nm" recited in claim 10 of the above indicates an average secondary particle diameter of the dispersion of cuprous oxide ultrafine particles, which is obtained *in the third step*. For clarification, Applicants have amended claim 10 as follows:

10. A method for producing a dispersion of cuprous oxide ultrafine particles according to claim 9, wherein the cuprous oxide ultrafine particles have an average secondary particle diameter of less than 200 nm in the dispersion of cuprous oxide ultrafine particles which is in the colloidal state obtained in the third step.

Additionally, the Examiner notes that claim 11 depends from cancelled claim 8. In response, Applicants have amended claim 11 to depend from claim 9.

In view of the foregoing, Applicants respectfully submit that the claims, as currently amended, particularly point out and distinctly claim the subject matter which Applicants regard as the invention. As such, reconsideration and withdrawal of the rejection are respectfully requested.

II. Issues arising under 35 U.S.C. § 103

The Examiner maintains the rejection of claims 9-13, 20, 30, 32 and 34 as being unpatentable over Curtis et al. (Angewandte Chemie, 1988, 27:1530-33) under 35 U.S.C. § 103(a). Applicants respectfully traverse the rejection.

II-A. Claim 9

Claim 9 recites the following steps:

- 1) a first step of synthesizing cuprous oxide ultrafine particles having an average primary particle diameter of not more than 100 nm in a first solvent and simultaneously therewith obtaining a *soft agglomerate* of cuprous oxide ultrafine particles having a secondary particle diameter of not less than 0.2 μm ,
- 2) a second step of separating the *soft agglomerate* obtained at the first step from the first solvent, and
- 3) a third step of redispersing the *soft agglomerate* separated at the second step in a second solvent to obtain a dispersion of cuprous oxide ultrafine particles in the colloidal state wherein the cuprous oxide ultrafine particles are suspended in the dispersion.

Applicants respectfully submit that Curtis fails to teach or fairly suggest all three steps. It is especially clear from a careful reading of Curtis, that Curtis does not teach the formation of a soft agglomerate, as presently claimed. In fact, Curtis attempts to make aggregates, but is not able to. We now discuss Curtis in detail.

At column 2, 1st full paragraph of page 1530, Curtis teaches the formation of copper sol by combining copper (II) acetate, PVP, and hydrazine hydrate in acetonitrile (under inert atmosphere with heat). This gives platelike crystals (“hexagons”) having a mean edge-to-edge diameter of 27 nm and elliptical particles having an equivalent circle diameter of 10 nm (See

column 1, 1st full paragraph on page 1531). As shown in Fig. 3, the mean particle diameter for the whole system is 22.6 nm.

However, Curtis was not successful in forming aggregates in the first step, and so Curtis attempts to make aggregates (agglomerates) in a second step. Applicants note that at page 1532, 1st paragraph of column 1, Curtis discusses “difficulties in attempting to aggregate this sol. Neither solvent evaporation nor addition of a miscible ‘non-solvent’ for the polymer... succeeded in providing suitably aggregated samples.” Furthermore, it appears that no agglomerate is formed in the second step of Curtis based on the statement: “Even within these groups the particle surfaces were never in contact.” Also, in the last full paragraph of column 1, Curtis states that aggregation did not occur upon evaporation of the solvents. In addition, see Fig 5 and the description below Fig 5 which states that there is no indication of “any interparticle contact.” On the contrary, inventive claim 9 requires that the agglomerate is formed in the first step. As such, there are significant patentable distinctions between inventive claim 9 and the teachings of Curtis.

II-B. Claim 20

Claim 20 recites the following:

A method for producing cuprous oxide ultrafine particles having an average primary particle diameter of not more than 100 nm and an average secondary particle diameter of less than 0.2 μ m, which comprises obtaining cuprous oxide ultrafine particles which are in the colloidal state by dispersing the *soft agglomerate* of cuprous oxide ultrafine particles.

Claim 20 recites the third step of claim 9 which requires the presence of a *soft agglomerate*. As mentioned above, Curtis fails to teach or suggest the formation of a soft agglomerate. In view of the fact that Curtis does not prepare a soft agglomerate of cuprous oxide ultrafine particles, Curtis does not render claim 20 obvious.

II-C. Claims 30 and 32

Claim 30 recites the following:

A method for producing a *soft agglomerate* of cuprous oxide ultrafine particles having an average primary particle diameter of not more than 100 nm and an average secondary particle diameter of not less than 0.2 μm ,

which comprises reducing a cuprous carboxyl compound of copper acetate with hydrazine and/or a hydrazine derivative in an amount of 0.4-5.0 moles based on 1 mole of the cuprous carboxyl compound in an aqueous solution containing not less than 10% by weight of water to produce cuprous oxide ultrafine particles, wherein the aqueous solution further comprises at least one organic compound selected from the group consisting of an alcohol compound, ether compound, ester compound and amide compound.

Claim 32 is similar to claim 30, except that claim 32 recites that a base is added to the reaction during the formation of the particles.

As mentioned above, Curtis does not teach a *soft agglomerate* of cuprous oxide ultrafine particles having an average secondary particle diameter of not less than 0.2 μm , as recited in claim 30. Also, Curtis does not teach the specific solvents mentioned in claim 30.

The Examiner is aware that Curtis does not teach the ratio of hydrazine to copper acetate, as presently claimed. However, the Examiner asserts that Curtis and the instant invention only differ by the ratios of hydrazine to copper acetate and that to one skilled in the art it would have been obvious to vary the amounts of the reactants to arrive at the present invention.

In response, the Examiner's attention is respectfully directed to the comparative experiments in the present specification which show that there are unexpected results by maintaining the hydrazine and/or a hydrazine derivative in an amount of 0.4-5.0 moles based on 1 mole of the cuprous carboxyl compound. The following table contains the results from Examples 1-4 wherein the molar ratio of hydrazine to copper compound is maintained within 0.4-5.0, and the table also contains the results from Comparative Examples 1-2 wherein the molar ratio of hydrazine to copper compound is outside the range of 0.4-5.0.

Table

	Average Primary Particle Diameter Of The Precipitate	Average Secondary Particle Diameter	Molar Ratio Of Hydrazine (Derivative) To Cuprous Carboxyl Compound
Inventive Ex. 1	20 nm	800 microns	1.2
Inventive Ex. 2	30 nm	300 microns	0.6
Inventive Ex. 3	60 nm	200 microns	3.0
Inventive Ex. 4	50 nm	180 microns	0.9
Comp. Ex. 1	metallic copper formed		5.5
Comp. Ex. 2	200 nm		0.3

In Inventive Examples 1-4, wherein the hydrazine and/or a hydrazine derivative was maintained in an amount of 0.4-5.0 moles based on 1 mole of the cuprous carboxyl compound, cuprous oxide ultrafine particles were formed having an average primary particle diameter of not more than 100 nm and an average secondary particle diameter of not less than 0.2 μ m, as claimed. However, when the hydrazine and/or a hydrazine derivative was at 5.5 moles based on 1 mole of the cuprous carboxyl compound, metallic copper formed, see Comparative Example 1. Also, when the hydrazine and/or a hydrazine derivative was at 0.3 moles based on 1 mole of the cuprous carboxyl compound, then cuprous oxide was formed having an average primary particle diameter of 200 nm, see Comparative Example 2. Applicants respectfully submit that this link between the ratio of the hydrazine and/or a hydrazine derivative to the cuprous carboxyl compound and the resulting particle characteristics would be unexpected based on the teachings of Curtis.

Furthermore, with respect to **claim 32**, Curtis does not teach or suggest the use of any base.

As such, there are significant patentable distinctions between inventive claims 30 and 32 and the teachings of Curtis.

Based on the foregoing, a *prima facie* case of obviousness cannot be said to exist. Reconsideration and withdrawal of the rejection are respectfully requested.

III. Improper Finality

Applicants respectfully submit that the finality of the outstanding Office Action is improper. The Examiner has not fully explained his position in the outstanding Office Action. Claims 9, 20, 30 and 32 are independent claims. However, the Examiner only discusses the hydrazine to copper acetate ratio which is recited in claims 30 and 32 but not in claims 9 and 20. According to MPEP 706,

The goal of examination is to clearly articulate any rejection early in the prosecution process so that the applicant has the opportunity to provide evidence of patentability and otherwise reply completely at the earliest opportunity.

In view of the fact that the Examiner has not clearly articulated the rejection of claims 9 and 20, Applicants respectfully request that the finality of the June 26, 2009 Office Action **be withdrawn**. As a consequence of the withdrawal of the finality, Applicants request 1) entry of this Reply into the Official Record and 2) that the next Office Action (if not a Notice of Allowance) is a complete Office Action and not an Advisory Action.

In view of the above amendment, applicant believes the pending application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Garth M. Dahlen, Ph.D., Esq., Reg. No. 43,575, at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

Dated: *September 28, 2009*

Respectfully submitted,

By Gerald M. Murphy, Jr. #43575
Gerald M. Murphy, Jr. *for*
Registration No.: 28,977
BIRCH, STEWART, KOLASCH & BIRCH, LLP
8110 Gatehouse Road
Suite 100 East
P.O. Box 747
Falls Church, Virginia 22040-0747
(703) 205-8000
Attorney for Applicant